



WASHINGTON

By R. J. Minarik and N. L. Joseph

1989

U.S. DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

TN
24
.W2
W374
1989



WASHINGTON



U.S.
DEPARTMENT
OF THE
INTERIOR

Manuel Lujan, Jr.
Secretary



BUREAU
OF
MINES

T S Ary
Director

BLM Library
Denver Federal Center
Bldg. 50, OC-521
P.O. Box 25047
Denver, CO 80225

June 1991

Contents

Trends and Developments	1
Employment	1
Regulatory Issues	1
Exploration Activities	2
Legislation and Government Programs	2
Review by Nonfuel Mineral Commodities	2
Industrial Minerals	2
Calcium Chloride	2
Cement	2
Clays	3
Diatomite	3
Gypsum	3
Lime	3
Olivine	3
Peat	3
Sand and Gravel	3
Construction	3
Industrial	3
Stone	3
Crushed	3
Dimension	3
Sulfur (Recovered)	3
Metals	6
Aluminum	6
Arsenic	6
Gold and Silver	6
Magnesium Metal	7
Silicon	7
Zinc and Lead	7

Tables

Table 1.—Nonfuel Mineral Production in Washington	1
Table 2.—Washington: Crushed Stone Sold or Used by Producers in 1989, by Use	6
Table 3.—Washington: Crushed Stone Sold or Used by Producers in 1989, by Use and District	7
Table 4.—Principal Producers	8

State Map

Principal Mineral-Producing Localities
in Washington

COVER PHOTO:

The Washington Capitol Building in Olympia symbolizes the cooperative working relationship between the Bureau of Mines and the mineral agencies of the State. (Photo is courtesy of Harry T. Halverson, Olympia, WA.)

*For comments or further information, please contact
Spokane Regional Office of State Activities
East 360 Third Ave.
Spokane, WA 99202-1413
Telephone: (509) 353-2720;
FTS 439-2720*

THE MINERAL INDUSTRY OF WASHINGTON

This chapter has been prepared under a Memorandum of Understanding between the Bureau of Mines, U.S. Department of the Interior, and the Washington Division of Geology and Earth Resources for collecting information on all nonfuel minerals.

By R. J. Minarik¹ and N. L. Joseph²

Nonfuel mineral production value in Washington rose to \$480.9 million in 1989, an increase of almost 5% over that of 1988. Substantial increases in the production value of construction materials—portland cement, construction sand and gravel, and crushed stone—more than offset declines in gold and olivine values. Construction sand and gravel was the leading commodity in terms of value, followed by magnesium metal, gold, crushed stone, and portland cement.

Washington ranked 21st in the Nation in the value of nonfuel minerals production, up from a 22d ranking in 1988.

TRENDS AND DEVELOPMENTS

In 1989, Washington's mineral industry showed signs of strength and a

potential for growth. Three metal mines were reported in operation with gold and silver the primary commodities. Three precious-metal mines were under development or in the permitting stage. Although interest grew in Washington's precious metals, the metallic minerals—gold, magnesium, and silver—accounted for only 44% of the State's nonfuel mineral value in 1989, a 5% drop from that of 1988. The downturn mainly could be attributed to a decline in gold and silver prices. There was also increased exploration activity for base metals, primarily lead and zinc deposits in the Metaline Formation in Stevens and Pend Oreille Counties and copper porphyry deposits.

Industrial minerals showed a sharp increase in value of almost 16% over that of 1988, with construction sand and gravel, crushed stone, and portland cement leading the way. Twenty companies produced industrial minerals from 29 sites during the year.

EMPLOYMENT

The State's mining industry employment increased by 9% over that of 1988. According to the State of Washington Employment Security Department, mining and quarrying employment rose to about 3,600 workers, 300 more than the total recorded in 1988. Employment in the State's primary metals industry rose to 13,200 in 1989, an increase of 500 over that of 1988. Continued strength in the aluminum smelting sector was reflected in its employment numbers—8,900 workers by yearend, up from 8,600 in 1988 and 7,400 in 1987.

REGULATORY ISSUES

The U.S. Forest Service awarded Del Hur Industries of Port Angeles a \$3.1

TABLE 1
NONFUEL MINERAL PRODUCTION IN WASHINGTON¹

Mineral		1987		1988		1989	
		Quantity	Value (thousands)	Quantity	Value (thousands)	Quantity	Value (thousands)
Cement (portland)	thousand short tons	1,282	\$63,600	979	\$48,233	W	W
Clays	metric tons	377,020	2,356	376,924	2,235	233,267	\$1,591
Gem stones		NA	200	NA	200	NA	208
Peat	thousand short tons	7	191	5	142	W	W
Sand and gravel:							
Construction	do.	^e 25,300	^e 78,900	31,170	94,402	^e 37,800	^e 124,700
Industrial	do.	294	5,186	W	W	W	W
Stone:							
Crushed	do.	14,754	49,618	^e 13,900	^e 48,700	13,259	55,624
Dimension	short tons	297	42	^e 697	^e 60	W	W
Combined value of calcium chloride (natural, 1987-88), cement (masonry), copper (1987), diatomite, gold, gypsum, lime, magnesium metal, olivine, silver, and values indicated by symbol W							
		XX	238,341	XX	265,362	XX	298,756
Total		XX	438,434	XX	459,334	XX	480,879

^eEstimated. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" figure. XX Not applicable.

¹Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

million contract to clean up the extensive tailings pile at the former copper mine near Holden Village above Lake Chelan in Chelan County. The mine was operated by Howe Sound Mining Co. and produced copper and some gold, silver, and zinc between 1939 and 1957. Ownership of the tailings at the Holden Mine was held by the nearby Lutheran Church retreat; the tailings were leased to Red Butte Resources Ltd. The remote area could only be reached by boat and a steep, winding mountain road. The project included revegetation and the placement of riprap along a creek; 3 years were estimated for completion.

Negotiations continued on a disagreement between ASARCO Incorporated and the Environmental Protection Agency (EPA) about Asarco's plan to clean up the Superfund (Comprehensive Environmental Response, Compensation, and Liability Act of 1980) site around its former copper smelter near Tacoma, Pierce County. Asarco proposed to clean up two playgrounds near the closed smelter and create a cleanup fund instead of following an EPA plan to sample more than 1,100 residential lots for arsenic contamination.

EXPLORATION ACTIVITIES

Metals exploration and development remained strong in 1989 with more than 80 companies and individuals active.

According to Crown Resources Corp., results of the drilling program at its Buckhorn Mountain gold property, east of Chesaw, Okanogan County, were encouraging. The company announced several acquisitions, including the nearby Crystal Butte property optioned from Orvana Resources Corp. The 2,140-acre Keystone Gold Inc. property on the west and east sides of Buckhorn Mountain was optioned from Curlew Lake Resources; also included was the Strawberry Lake property, 4 miles west of Buckhorn Mountain.

The joint venture of Crown Resources and Cambior USA Inc. continued exploration and development of the Ida and Mount Elizabeth gold properties in Okanogan and Ferry Counties. United States Borax & Chemical Corp. and Westmont Mining Inc. maintained exploration programs near Manhattan Mountain in the Torada Creek Graben. In the

Republic Graben, Crown Resources and Sutton Resources Inc. explored the South Penn and Seattle gold prospects; Boise Cascade Corp. did some drilling and trenching west of the town of Republic. Inland Gold and Silver Corp. and Pegasus Gold Corp., in a joint venture with N. A. Degerstrom Inc., explored for gold at the Leland-Kellogg property, which is west and north of the Overlook Mine, currently being developed by Echo Bay Exploration Inc. In addition to drilling and mapping the site, the joint venture did an array of geophysical and geochemical tests.

In the Wenatchee Heights area of Chelan County, Asamera Minerals Inc. conducted a drilling program approximately 3.5 miles southeast of its Cannon gold mine and staked new claims at several sites north of the Wenatchee River. U.S. Borax explored for gold at its Skyline property northwest of Wenatchee.

Orient Mining Co., a joint venture of Boise Cascade and Pathfinder Gold Corp., drilled and mapped in the First Thought area, Stevens County. Also in Stevens County, Boise Cascade drilled for gold at the McNally-Freedom prospect, Newmont Exploration Ltd. drilled near the old Kettle River Mine, Vanhorn and Watson Mining Co. sampled at the Copper Penny and Gold Nugget properties, and Formation Capital investigated the Reed Iron deposit.

Steelhead Resources Ltd. reached an agreement with FMC Gold Corp. wherein FMC Gold obtained an option and performed a detailed feasibility evaluation of the Excelsior gold property in Whatcom County. In Pend Oreille County, Raven Hill Mining Co. continued surface exploration for copper and silver at the Cooks Copper property and began the dewatering of its Glass Mountain base and precious-metals mine.

Interest in base metal exploration was renewed. The joint venture of Vanderbilt Gold Corp. and Brenda Inc. leased a copper-molybdenum property near Mazama, Okanogan County, from Quintana Minerals Corp. Wilbur Hallauer drilled the Starr Molybdenum property on Aeneas Mountain 10 miles west of Tonasket and also the Kelsey property, a low-grade porphyry copper and molybdenum deposit. In Skamania County, Plexus Resources Corp. drilled the Silver Star property looking for copper, molybdenum, and silver.

The joint venture of Southern Talc Co.

and First Mississippi Corp. explored for talc at their Totem Talc property in Pend Oreille County; a plan of operation was submitted to the U.S. Forest Service. Basic Resources Corp. continued to drill and test deposits of nonswelling bentonite clays at the Rock Top property in Grant County.

LEGISLATION AND GOVERNMENT PROGRAMS

Total revenue to the State from prospecting, mining, and quarrying on State lands was \$687,000 for the fiscal year ending June 30, 1989. Increased payments from sand and gravel quarrying resulted in a 44% increase in revenue to the State compared with the fiscal year ending June 30, 1988.

The Mining and Mineral Resources Institute of the University of Washington, Seattle, received an allotment of \$195,000 from the Bureau of Mines in 1989. The school had received a total of \$1.7 million since inception of the Mineral Institute Program in 1978.

REVIEW BY NONFUEL MINERAL COMMODITIES

Industrial Minerals

Calcium Chloride.—Occidental Chemical Corp. in Tacoma, Pierce County, manufactured synthetic calcium chloride using hydrochloric acid and limestone barged in from British Columbia, Canada.

Cement.—The State's portland cement production and sales remained relatively the same in quantity and showed a modest increase in value from those of 1988.

Portland cement was produced by Ideal Basic Industries Inc. in King County and by LaFarge Corp. in Pend Oreille County. Also in King County, Ash Grove Cement West Inc. mined silica from the Superior Quarry, operated a grinding facility, and maintained a bulk cement distribution center from where it sold portland cement. All three facilities sold modest amounts of masonry cement.

The Lehigh Portland Cement Co. plant in Metaline Falls was purchased, along with the company's distribution terminals,

by LaFarge Corp., a prominent French cement manufacturer. This dry-process facility was the only cement plant to use stone that was mined in the State. Ideal Basic was the State's largest producer of cement. Limestone for its wet-process facility in Seattle was barged in from Texada Island, British Columbia. The Bellingham cement plant operated by Tilbury Cement Co. of Delta, British Columbia, was used only to grind clinker for portland cement in 1989.

The bulk of Washington's cement production was general use, moderate-heat, Types I and II gray portland cement, with lesser amounts of high-early-strength Type II and high-sulfate-resistant Type V; oil well and pozzolanic cements also were produced. Portland cement was used by ready-mixed concrete companies (63%), building material dealers (10%), other contractors (8%), concrete products manufacturers (6%), highway contractors and government agencies (2%), and miscellaneous customers (11%).

Individual cement plants used a mix of natural gas, fuel oil, and bituminous and anthracite coal for fuel; electricity also was purchased for energy. Raw materials consumed were anhydrite, cement rock, clay, fly ash, gypsum, iron ore, limestone, pyrite, quartz, sand, and slag.

Clays.—Clay production in 1989 dropped sharply, by 38% in quantity and 29% in value, from that of 1988. Common clay was produced by five companies from eight pits in five counties. About 82% of the production came from Clallam and King Counties. Fire clay was produced from three pits in two counties.

Mutual Materials Co. was the largest clay producer in the State. Most of its clay was mined from pits in King County. Another major King County clay producer was Moulden & Sons Inc. Ideal Basic Industries mined the Twin River Quarry, Clallam County, the largest clay pit in the State. The clay was barged to the Ideal Cement plant at Seattle for the production of portland cement. Clay was also mined by Interpace Industries Corp. and used at its Mica brick plant in Spokane County.

Diatomite.—Washington diatomite production dropped slightly in quantity and more than 6% in value from that of 1988. The Inorganic Specialties Div. of Witco Corp., the State's sole producer, mined diatomaceous material from two

pits in Grant County. A new pit was permitted in the Frenchman Hills. Diatomaceous earth was processed and calcined at a plant in Quincy. The bulk of the diatomite was used for filtration, with a small quantity consumed as paint filler.

Gypsum.—The quantity of crude gypsum produced in the State remained relatively the same, but value almost doubled from that of 1988. Agro Minerals Inc. operated the Poison Lake Mine near Tonasket, Okanogan County, the only crude gypsum mine in the State. Agro Minerals has mined gypsite from small saline lake bottoms since 1948; the dried and sized product was used as a soil conditioner. Calcined gypsum was produced by James Hardie Gypsum in Seattle and by Domtar Gypsum America Inc. at Tacoma.

Lime.—Although the quantity of lime produced dropped by more than 2%, value increased by more than 2% from that of 1988. Quicklime was produced at a plant in Addy, Stevens County, by Northwest Alloys Inc., the State's largest producer. The Tacoma Lime Div. of Continental Lime Inc. produced both quicklime and hydrated lime at its Tacoma plant in Pierce County.

Olivine.—Washington was one of two States to produce olivine in 1989. The level of production dropped sharply, quantity declined by 10%, and value fell almost 52% from that of 1988. Olivine Corp. mined and milled olivine from the Swen Larsen quarry in Whatcom County. Part of the production was used in the fabrication of modular olivine refractory slabs. Olivine Corp. no longer refined the crude production but sold it to Applied Industrial Minerals Corp. (AIMCOR), which processed the material at its plant in Skagit County. AIMCOR sold the refined product for use as foundry and blasting sands both domestically and as an export to South America and Pacific Rim countries. AIMCOR formerly mined an olivine-bearing till from the Twin Sisters quarry in Skagit County, but the deposit is now depleted.

Peat.—The quantity and value of Washington's peat production dropped sharply from that of 1988. Three companies in Grays Harbor, Kitsap, and Okanogan Counties reported production.

Sand and Gravel.—Construction.—Construction sand and gravel production is surveyed by the Bureau of Mines for

even-numbered years only; data for odd-numbered years are based on annual company estimates. This chapter contains estimates for 1987 and 1989 and actual data for 1988.

The State's 1989 construction sand and gravel production increased significantly, more than 21% in quantity and about 32% in value. Prosperity in the private-sector construction industry and the ongoing construction of several large-scale Puget Sound area governmental projects kept construction sand and gravel production at a high level.

Industrial.—Production of industrial sand and gravel rose modestly in tonnage and by almost 6% in quantity from that of 1988. Production was reported from three operations: L-Bar Products Inc. mined one pit near Ravensdale, King County, and Lane Mountain Silica Co. operated two pits near Valley, Stevens County. Ash Grove Cement West mined, crushed, and screened silica at the Superior Quarry, King County. Primary uses for the industrial sand and gravel were glass containers (43%), flat-glass manufacture (15%), cement manufacture (12%), sandblasting (10%), and fiberglass (9%).

Stone.—Crushed.—Stone production is surveyed by the Bureau of Mines for odd-numbered years only; data for even-numbered years are based on annual company estimates. This chapter contains actual data for 1987 and 1989 and estimates for 1988.

The volume of crushed stone produced in 1989 dropped nearly 5% from that estimated for 1988, but the value increased more than 14%. Production was reported in 36 of the State's 39 counties. Five counties—Benton, Clark, Cowlitz, Snohomish, and Spokane—accounted for nearly 52% of the State's total production. Traprock accounted for the bulk of the production, almost 77% of the total Washington crushed stone output, followed by, in order of quantity produced, sandstone, limestone, granite, dolomite, and volcanic cinder.

Dimension.—Dimension stone was produced by two companies: Island Frontier Landscape Construction Co. operated two quarries in Skagit County, and Heatherstone Inc. reported production from one quarry in Yakima County.

Sulfur (Recovered).—All of the State's sulfur production was recovered as

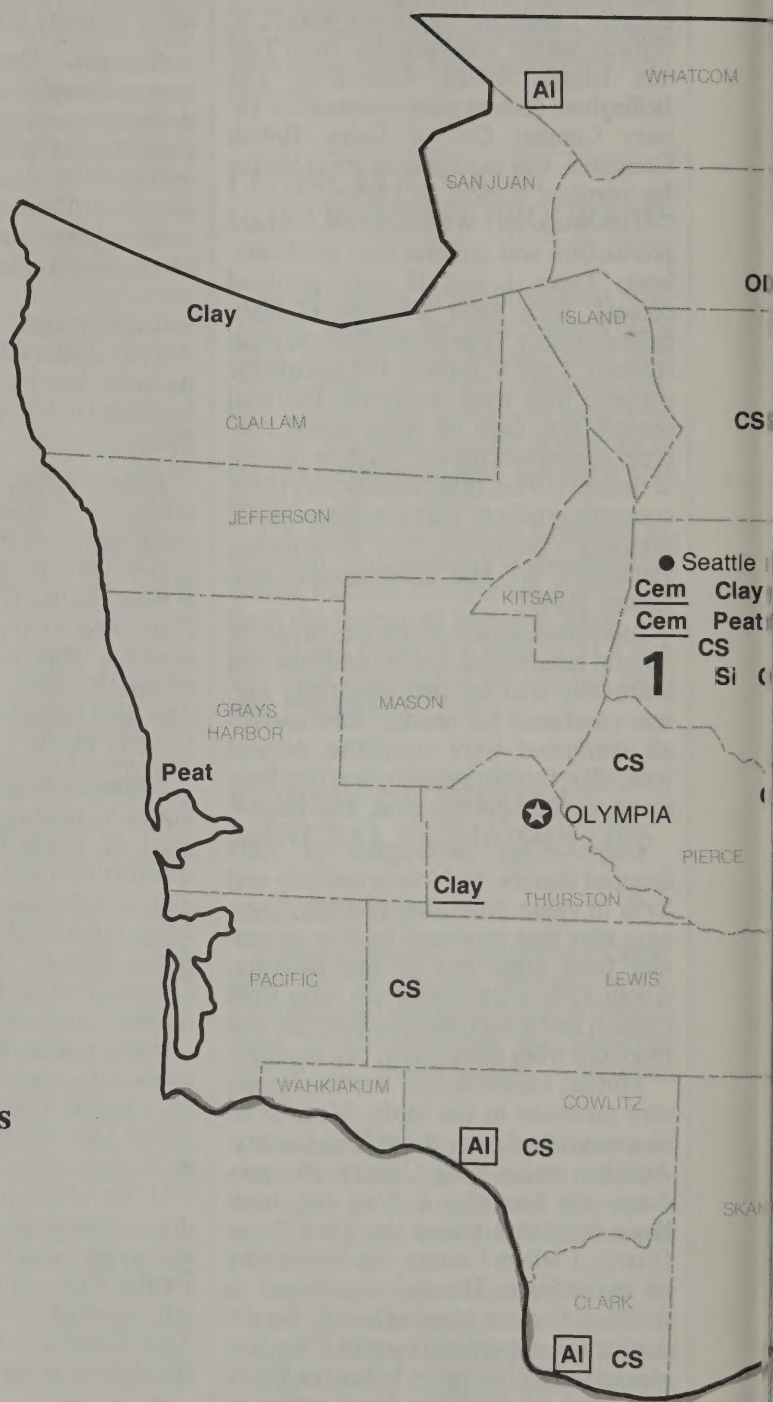
LEGEND

- State boundary
- - - County boundary
- ★ Capital
- City
- ▬ Waterway
- ▬ Crushed stone/sand & gravel districts

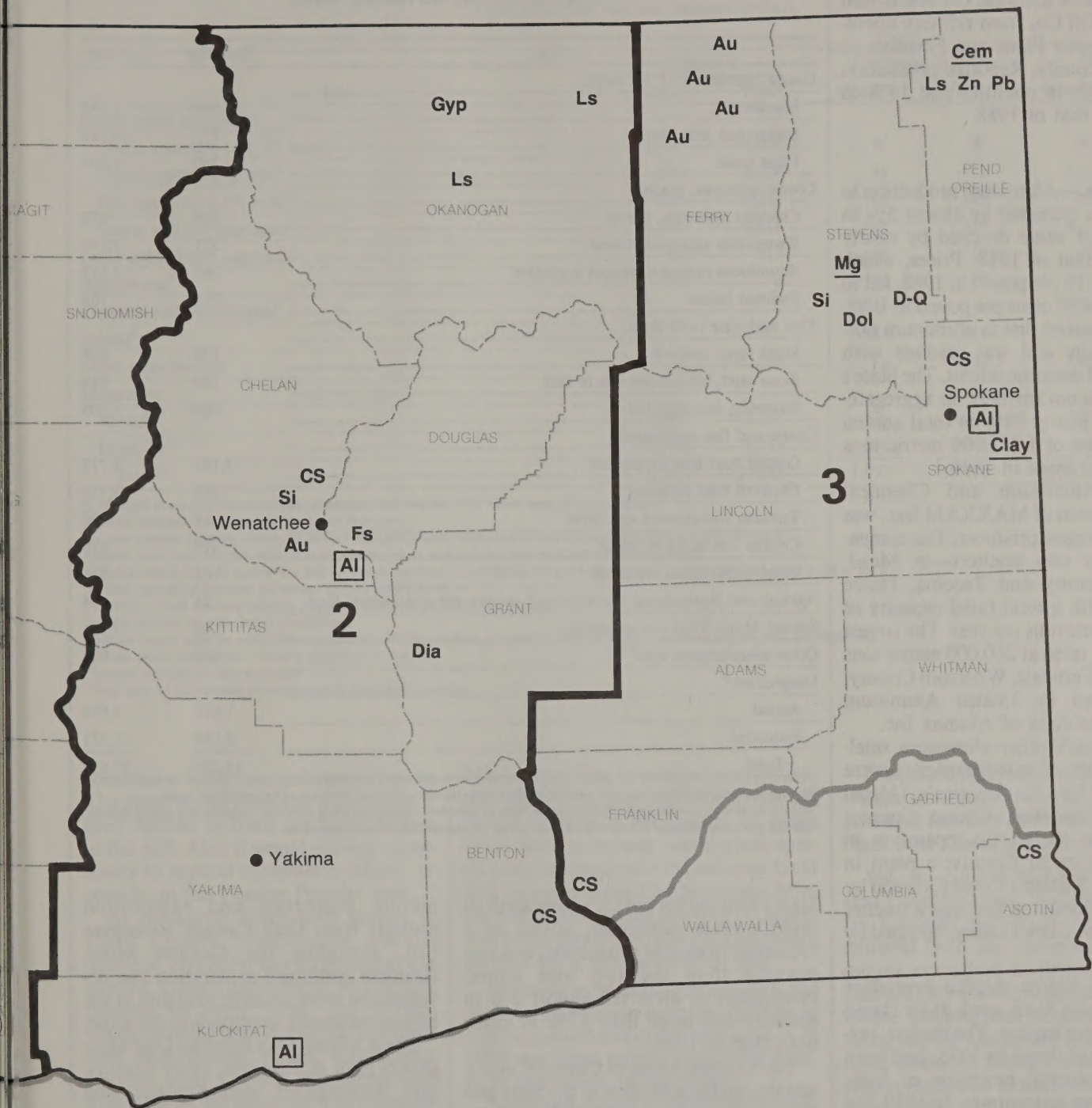
MINERAL SYMBOLS

- Al** Aluminum plant
- Au** Gold
- Clay** Clay
- CS** Crushed Stone
- D-Q** Dimension Quartzite
- Dia** Diatomite
- Dol** Dolomite
- Fs** Ferrosilic
- Gyp** Gypsum
- Ls** Limestone
- Mg** Magnesium metal plant
- Ol** Olivine
- Pb** Lead
- Peat** Peat
- Si** Silica
- Zn** Zinc

Principal Mineral-Producing Localities



INGTON



byproduct from petroleum refining in the Puget Sound area. Companies reporting production were Shell Oil Co. and Texaco Inc. from their Skagit County refineries and Atlantic Richfield Co. and British Petroleum Oil Co. from refinery operations at Cherry Point and Ferndale in Whatcom County. Reported production dropped 13% in quantity and 14% in value from that of 1988.

Metals

Aluminum.—Aluminum production in Washington increased by almost 5% in quantity, but value dropped by nearly 17% from that of 1988. Prices, which averaged \$1.10 per pound in 1988, fell to an average of 88 cents per pound in 1989. The State ranked first in aluminum output nationally and was credited with 30% of total domestic output. The State's seven aluminum smelters, in aggregate, operated at nearly 98% of total annual rated capacity of 1,231,000 metric tons of aluminum ingot in 1989.³

Kaiser Aluminum and Chemical Corp., a division of MAXXAM Inc., was the State's largest producer. The company operated two smelters—in Mead, Spokane County and Tacoma, Pierce County—with a total rated capacity of 274,000 metric tons per year. The largest single plant, rated at 260,000 metric tons per year, in Ferndale, Whatcom County, was operated by Intalco Aluminum Corp., a subsidiary of Alumax Inc.

Washington's other aluminum smelters, by order of rated capacity, were Aluminum Co. of America's (Alcoa) plant in Wenatchee, Chelan County; the Reynolds Metals Co. operation in Longview, Cowlitz County; a plant in Goldendale, Klickitat County, owned by Columbia Aluminum Co.; and a smelter in Vancouver, Clark County, operated by Vanalco Inc.

Arsenic.—Asarco shipped byproduct arsenic trioxide from stock at its closed Tacoma copper smelter. The smelter, permanently shut down in 1985, had been the only domestic processor of high-arsenic copper concentrate. In 1989, the shipments of arsenic from the stockpile decreased by 50%, and the value of shipments dropped by almost 42%.

Gold and Silver.—Two lode mines in Chelan and Ferry Counties reported production in 1989. Total gold production dropped 3% in quantity and more than 15% in value from that of 1988; the

TABLE 2
WASHINGTON: CRUSHED STONE¹ SOLD OR USED
BY PRODUCERS IN 1989, BY USE

(Thousand short tons and thousand dollars)

Use	Quantity	Value
Coarse aggregate (+ 1 1/2 inch):		
Macadam	549	2,182
Riprap and jetty stone	773	10,745
Filter stone	250	1,141
Coarse aggregate, graded:		
Concrete aggregate, coarse	209	874
Bituminous aggregate, coarse	371	1,197
Bituminous surface-treatment aggregate	365	1,113
Railroad ballast	233	764
Fine aggregate (-3/8 inch):		
Stone sand, concrete	170	604
Stone sand, bituminous mix or seal	130	414
Screening, undesignated	684	1,305
Coarse and fine aggregates:		
Graded road base or subbase	3,191	9,712
Unpaved road surfacing	762	2,736
Terrazzo and exposed aggregate	19	190
Crusher run or fill or waste	319	659
Other construction materials	102	525
Agricultural: Agricultural limestone and poultry grit and mineral food	21	134
Special: Other fillers and extenders	40	3,804
Other miscellaneous uses ²	206	995
Unspecified: ³		
Actual	1,816	4,959
Estimated	3,049	11,571
Total	13,259	55,624

¹Includes traprock, sandstone, limestone, granite, dolomite, volcanic cinder or scoria, quartzite, and miscellaneous stone.

²Includes stone used in cement manufacture, asphalt fillers or extenders, whitening or whitening substitute, abrasives, and roofing granules.

³Includes production reported without a breakdown by end use and estimates for nonrespondents.

State's ranking for gold fell from sixth to seventh place nationally. Silver, as a byproduct from gold production, was also reported from the two lode mines. Production of silver fell almost 2% in quantity and more than 17% in value from that of 1988.

The Cannon Mine in Chelan County was the largest gold mine in the State and the second largest underground gold mine in the Nation. The joint venture between Asamera Minerals (U.S.) Inc., as the operator, and Breakwater Resources Ltd. ranked 15th nationally in terms of value of gold production in 1989. Corona Corp. announced that, if approved by the board of directors for both companies, it would acquire all of Asamera Mineral's U.S.

mining properties and exploration projects from Gulf Canada Resources Ltd., including the Cannon Mine. Asamera continued exploration and development work underground and in the area immediately surrounding the mine.

Hecla Mining Co.'s Republic Unit Mine (Knob Hill) at Republic, Ferry County, was Washington's second-ranked gold producer and the State's top-ranked silver producer. In June, Hecla celebrated production of the 2 millionth ounce of gold hoisted from a single shaft. This milestone was achieved by the Knob Hill No. 2 shaft; only six other shafts in the Nation have achieved this production. Hecla was doing extensive underground and surface exploration and announced plans to

TABLE 3
**WASHINGTON: CRUSHED STONE SOLD OR USED
BY PRODUCERS IN 1989, BY USE AND DISTRICT**

(Thousand short tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction aggregates:						
Coarse aggregate (+1 1/2 inch) ¹	1,562	14,050	W	W	W	W
Coarse aggregate, graded ²	576	1,928	89	472	512	1,547
Fine aggregate (-3/8 inch) ³	830	1,742	143	545	11	37
Coarse and fine aggregates ⁴	3,130	9,571	348	1,438	813	2,289
Other construction aggregates	96	514	14	19	2	10
Agricultural ⁵	4	6	(⁶)	(⁶)	(⁶)	(⁶)
Chemical and metallurgical ⁷	—	—	—	—	93	265
Special ⁸	—	—	37	3,715	5	136
Other miscellaneous	26	79	66	232	36	500
Unspecified:						
Actual ⁹	947	3,391	576	1,055	293	513
Estimated ¹⁰	1,729	6,184	698	3,298	621	2,089
Total ¹¹	8,901	37,465	1,972	10,773	2,386	7,386

W Withheld to avoid disclosing company proprietary data; included with "Other construction aggregates."

¹Includes macadam, riprap and jetty stone, and filter stone.

²Includes concrete aggregate (coarse), bituminous aggregate (coarse), bituminous surface-treatment aggregate, and railroad ballast.

³Includes stone sand (concrete), stone sand (bituminous mix or seal), and fine aggregates (screening-undesignated).

⁴Includes crushed stone for graded road base or subbase, unpaved road surfacing, terrazzo and exposed aggregates, and crusher run or fill or waste.

⁵Includes agricultural limestone and poultry grit and mineral food.

⁶Withheld to avoid disclosing company proprietary data; included with "Other miscellaneous."

⁷Includes crushed stone for cement manufacture.

⁸Includes crushed stone for asphalt fillers or extenders, whitening or whitening substitutes, other fillers or extenders, roofing granules, and abrasives.

⁹Includes production reported without a breakdown by end use.

¹⁰Includes estimates for nonrespondents.

¹¹Data may not add to totals shown because of independent rounding.

construct a 4,000-foot underground ramp. The ramp would allow the use of rubber-tired vehicles to truck ore from the face to the mill. Also, it would provide opportunity to expand exploration efforts, especially in the Golden Promise area.

At its Kettle River gold project in Ferry County, construction was on schedule, and Echo Bay Exploration was moving toward commercial production, planned for early 1990. The project, which included both the Kettle and Overlook underground mines, was a joint venture with Crown Resources with Echo Bay as the operator. The company constructed main haulageways for both mines and a flotation mill. The 1,500-ton-per-day Key mill will contain a carbon-in-pulp vat-leach system to recover gold and silver from flotation concentrates. The mill is sited near the Overlook Mine.

Gold Mountain Mine, formerly the Gold Dike property, was acquired by Gold Express Corp. from Vulcan Mountain

Mining Inc. The operation, a joint venture with N. A. Degerstrom Inc., was expected to resume production in 1990. Plans were to enlarge the original open pit and to expand onto the adjacent Gold Hill property owned by Sundance Mining and Development Inc. The company was in the process of acquiring necessary permits for a new heap-leach pad.

Magnesium Metal.—The quantity and value of magnesium metal production in 1989 remained essentially the same as in 1988; the State ranked second nationally in production of the metal.

Northwest Alloys, a wholly owned subsidiary of Alcoa, produced magnesium metal at its plant at Addy, Stevens County. The Addy plant produced the metal from locally mined dolomite, employing a silicothermic process using ferrosilicon and aluminum-quartzite flux. Approximately two-thirds of the production went to Alcoa for use as an alloy in aluminum.

Northwest Alloys sold its process waste sludge to L-Bar Products Inc., which produced fertilizer from the sludge at its plant near Chewelah, Stevens County.

Silicon.—Silicon Metaltech Inc. operated a silicon plant at Rock Island, Douglas County; the plant obtained raw material from the company's quartzite mining operations in British Columbia, Canada. The plant produced ferrosilicon for the iron and steel industry and silicon metal for the aluminum industry. Silica fume produced during the production of silicon metal and ferrosilicon was sold as a strengthener for concrete products.

Northwest Alloys closed its silicon furnaces at Addy. The company had mined quartzite from the Blue Creek Mine near Addy until silicon production ceased.

Zinc and Lead.—For part of the year, in Stevens County, Cordilleran Development Inc. shipped ore from the newly reopened Shumaker lead-zinc mine to a

mill near Greenwood, British Columbia. The company later closed the mine and said it would resume production when it could construct its own mill on-site or find one closer to the property.

Equinox Resources Ltd. optioned the Van Stone zinc property from Callahan Mining Co. The company completed a prefeasibility study examining the potential of developing an underground mine. The mine was last operated in 1971 by Asarco as an open pit. Equinox acquired funding from Cominco Ltd. in return for priority rights to purchase

concentrate for its smelter at Trail, British Columbia, 25 miles to the north. The property includes a 1,100-ton-per-day mill and other infrastructure from when it was last operated. Mines Management Inc. leased its Advance and Iroquois zinc properties in Stevens County to Equinox Resources.

There was new activity at the dormant Pend Oreille zinc-lead mine at Metaline Falls, Pend Oreille County. Resource Finance Inc. (RFI) of Toronto, Ontario, acquired a lease option for the property from Pitlar Corp., a wholly owned

subsidiary of Gulf Resources Corp. The mine, closed by Gulf Resources in 1977, was Washington's largest zinc producer. RFI was in the process of dewatering the mine and was doing underground exploration drilling.

¹State Mineral Officer, Bureau of Mines, Spokane, WA. He has covered the mineral activities in Washington for 2 years. Assistance in the preparation of the chapter was given by W. A. Lyons, editorial assistant.

²Geologist, Washington Division of Geology and Earth Resources, Spokane, WA.

³American Metal Market, V. 97, No. 165, Aug. 24, 1989.

TABLE 4
PRINCIPAL PRODUCERS

Commodity and company	Address	Type of activity	County
Aluminum:			
Aluminum Co. of America	Box 221 Wenatchee, WA 98801	Plant	Chelan.
Columbia Aluminum Co.	Star Rt. 667, Box 46 Goldendale, WA 98620	do.	Klickitat.
Intalco Aluminum Corp.	Box 937 Ferndale, WA 98248	do.	Whatcom.
Kaiser Aluminum and Chemical Corp.	Box 6217 Spokane, WA 99207	do.	Spokane.
Do.	3400 Taylor Way Tacoma, WA 98421	do.	Pierce.
Reynolds Metals Co.	Box 999 Longview, WA 98632	do.	Cowlitz.
Vanalco Inc.	Box 120 Vancouver, WA 98660	do.	Clark.
Cement:			
Ash Grove Cement West Inc.	5550 SW. Macadam Ave. Suite 300 Portland, OR 97201	do.	King.
Ideal Basic Industries Inc.	Box 8789 Denver, CO 80201	do.	Do.
LaFarge Corp.	210 East Third St. Metaline Falls, WA 99153	do.	Pend Oreille.
Clays:			
Ideal Basic Industries Inc.	Box 8789 Denver, CO 80201	Pit	Clallam.
Mutual Materials Co.	Box 2009 Bellevue, WA 98009	Pits and plant	King and Pierce.
Diatomite:			
Inorganic Specialties, a division of Witco Corp.	520 Madison Ave. New York, NY 10072	Mine and plant	Grant.
Gold:			
Asamera Minerals (U.S.) Inc.	2100, 144 4th Ave. SW. Calgary, AB T2P 3N4 Canada	Underground mine and mill	Chelan.
Hecla Mining Co.	6500 Mineral Dr. Box C-8000 Coeur d'Alene, ID 83814	do.	Ferry.

TABLE 4—Continued
PRINCIPAL PRODUCERS

Commodity and company	Address	Type of activity	County
Lime:			
Continental Lime Inc.	1220 Alexander Ave. Tacoma, WA 98421	Plant	Pierce.
Northwest Alloys Inc.	Box 115 Addy, WA 99101	Mine and plant	Stevens.
Magnesium:			
Northwest Alloys Inc.	Box 138A, Rt. 1 Addy, WA 99101	do.	Do.
Olivine:			
AIMCOR	Box 58 Hamilton, WA 98225	do.	Skagit.
Peat:			
Bonaparte Peat	Aeneas Rt., Box 5 Tonasket, WA 98855	Bog	Okanogan.
Chrystel Soils	Ocean City, WA 98569	Bog	Grays Harbor.
Sand and gravel:			
Industrial:			
Lane Mountain Silica Co.	Box 236 Valley, WA 99181	Quarry and plant	Stevens.
L-Bar Products Inc.	Box 95 Ravensdale, WA 98051	do.	King.
Silver:			
Hecla Mining Co.	6500 Mineral Dr. Box C-8000 Coeur d'Alene, ID 83814	Underground mine and mill	Ferry.
Stone:			
Crushed:			
Cadman Rock Co. Inc.	Box 790 Monroe, WA 98272	Quarries	Snohomish and King.
DeAtley Co., a division of Eucon Co.	Box 648 Lewiston, ID 83501	do.	Various.
Weyerhaeuser Co., Mineral Resource Div.	Tacoma, WA 98477	do.	Do.
Dimension:			
Island Frontier Landscape Construction Co.	435 Gibraltar Rd. Anacortes, WA 98211	do.	Skagit.

MINERAL-RELATED GOVERNMENT AGENCIES

FEDERAL

U.S. Department of the Interior
Bureau of Mines
Rodney J. Minarik, State Mineral Officer
Spokane Regional Office of State
Activities
East 360 Third Ave.
Spokane, WA 99202-1413
Telephone: (509) 353-2720

U.S. Department of the Interior
Bureau of Land Management
Patrick Geehan, Deputy State Director
for Mineral Resources
825 Northeast Multnomah St.
Box 2965
Portland, OR 97208
Telephone: (503) 231-4157

U.S. Department of the Interior
Geological Survey
Bill Bagby, Chief
Branch of Western Mineral Resources
345 Middlefield Rd., Mail Stop 941
Menlo Park, CA 94025
Telephone: (415) 853-8300

U.S. Department of Agriculture
Forest Service, Pacific Northwest Region
Carlin B. Jackson, Director
Lands and Minerals
319 Southwest Pine St.
Portland, OR 97208
Telephone: (503) 326-2921

STATE

Department of Natural Resources
Division of Geology and Earth Resources
Raymond Lasmanis, State Geologist
Mail Stop PY-12
Olympia, WA 98504
Telephone: (206) 753-5327

Department of Natural Resources
Division of Lands and Minerals
Bruce Mackey, Manager
Mail Stop LB-13
Olympia, WA 98504
Telephone: (206) 753-2989

Department of Ecology
Greg Sorlie, Manager
Central Operations Program
Mail Stop PV-11
Olympia, WA 98504
Telephone: (206) 459-6037

Department of Labor and Industries
Division of Industrial Safety
and Health
Technical Services Section
Ray Wax, Section Chief
Box 207, Bldg. #6
Olympia, WA 98504
Telephone: (206) 753-5835

**BLM Library
Denver Federal Center
Bldg. 50, OC-521
P.O. Box 25047
Denver, CO 80225**

